

CLAIMS

We claim:

- 5 1. A composition of matter comprising a blend of at least one fluoriodocarbon having the formula $C_aH_bBr_cCl_dFeIf^eN^gO^h$, wherein a is between and including 1 and 8; b is between and including 0 and 2; c, d, g, and h are each between and including 0 and 1; e is between and including 1 and 18; and f is between and including 1 and 2, with at least one additive.
- 10 2. The composition of claim 1 wherein at least one fluoriodocarbon is selected from the group consisting of: bromodifluoriodomethane, chlorodifluoriodomethane, 1,1,2,2,3,3,4,4,5,5-decafluoro-1,5-diiodopentane, difluorodiiodomethane, difluoriodomethane, 1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-1,6-diiodohexane, fluoroiodomethane, 1,1,1,2,3,3,3-heptafluoro-2-iodopropane, 1,1,2,2,3,3,3-heptafluoro-1-iodopropane, 1,1,2,2,3,3-hexafluoro-1,3-diiodopropane, 1-iodoheptadecafluorooctane, iodoheptafluorocyclobutane, 1-iodopentadeca-fluoroheptane, iodopentafluorocyclopropane, 1-iodo-tridecafluorohexane, 1-iodo-undecafluoropentane, N-iodobis-(trifluoromethyl)amine, 1,1,2,2,3,3,4,4,4-nonafluoro-1-iodobutane, 1,1,2,2,3,3,4,4-octafluoro-1,4-diiodobutane, pentafluoriodoethane, 1,1,2,2-tetrafluoro-1,2-diiodoethane, 1,1,2,2-tetrafluoro-1-iodoethane, 1,1,2-trifluoro-1-iodoethane, trifluoriodomethane, and trifluoromethyl-1,1,2,2-tetrafluoro-2-iodoethyl ether.
- 25 3. The composition of claim 2 where the additive is selected from the group consisting of: alcohols, esters, ethers, fluoroethers, hydrocarbons, hydrofluorocarbons, ketones, and perfluorocarbons.
- 30 4. The composition of claim 3 wherein the additive comprises an alcohol selected from the group consisting of: 1-butanol, 2-butanol, ethanol, methanol, 2-methyl-1-propanol, 2-methyl-2-propanol, 1-pentanol, 2-pentanol, 1-propanol, and 2-propanol.
- 35 5. The composition of claim 3 wherein the additive comprises an ester selected from the group consisting of: ethyl acetate, ethyl butanoate, ethyl propanoate, n-butyl acetate, n-pentyl acetate, hexyl acetate, isobutyl acetate,

isopropyl acetate, methyl acetate, methyl butanoate, methyl propanoate, n-propyl acetate, and sec-butyl acetate.

6. The composition of claim 3 wherein the additive comprises an ether
5 - selected from the group consisting of: diethyl ether, diisopropyl ether, dimethyl ether, di-n-butyl, di-n-propyl ether, 1,4-dioxane, ethylene oxide, propylene oxide, and tetrahydrofuran.

7. The composition of claim 3 wherein the additive comprises a
10 fluoroether selected from the group consisting of: bis-difluoromethyl ether, hexafluorodimethyl ether, hexafluorooxetane, methyl trifluoromethyl ether, octafluorodimethoxymethane, octafluoro-1,3-dioxolane, pentafluorodimethyl ether, 1,1,2,2',2'-pentafluoro methyl ethyl ether, and 1-trifluoromethoxy-1,1,2,2-tetrafluoroethane.

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8. The composition of claim 3 wherein the additive comprises a
hydrocarbon selected from the group consisting of: butane, cyclopropane, decane, 2,3-dimethylpentane, 2,4-dimethylpentane, 2,2-dimethylpropane, heptane, hexane, isobutane, ligroin, limonene, 2-methylbutane, 3-methylhexane, 3-
20 methylpentane, mineral spirits, naphtha, nonane, octane, pentane, petroleum ether, petroleum spirits, pinene, propane, Stoddard's solvent, toluene, turpentine, and undecane.

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9. The composition of claim 3 wherein the additive comprises a
hydrofluorocarbon selected from the group consisting of: difluoromethane, 1,1-difluoroethane, 1,1,1,2,3,3,3-heptafluoropropane, pentafluoroethane, 1,1,2,2,3-pentafluoropropane, 1,1,1,2-tetrafluoroethane, 1,1,1-trifluoroethane, and trifluoromethane.

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10. The composition of claim 3 wherein the additive comprises a
perfluorocarbon selected from the group consisting of: decafluorobutane, dodecafluoropentane, hexafluorocyclopropane, hexafluoroethane, octafluorocyclobutane, octafluoropropane, tetradecafluorohexane, and tetrafluoromethane.

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11. The composition of claim 3 wherein the fluoriodocarbon comprises CF₃I and the additive comprises at least one component selected from the group consisting of: trifluoromethane, difluoromethane, pentafluoroethane, 1,1,1-

trifluoroethane, propane, 1,1-difluoroethane, 1,1,1,2-tetrafluoroethane, butane, and pentafluoroiodoethane.

12. The composition of claim 3 wherein the fluoroiodocarbon comprises
5 CF₃I and the additive comprises at least one component selected from the group consisting of: butane and isobutane.

13. The composition of claim 3 wherein the fluoroiodocarbon comprises
CF₃CF₂CF₂I and the additive comprises at least one component selected from the
10 group consisting of: butane, diethyl ether, and pentane.

14. The composition of claim 3 wherein the fluoroiodocarbon comprises
CF₃CF₂CF₂CF₂I and the additive comprises at least one component selected
15 from the group consisting of: acetone, methyl acetate, methanol,
tetrahydrofuran, and hexanes.

15. The composition of claim 3 wherein the fluoroiodocarbon comprises
CF₃CF₂CF₂CF₂I and the additive comprises at least one component selected
20 from the group consisting of: ligroin, petroleum ether, ethanol, butanone, 2-
propanol, ethyl acetate, heptane, and naphtha.

16. The composition of claim 3 wherein the fluoroiodocarbon comprises
CF₃CF₂CF₂CF₂CF₂CF₂I and the additive comprises at least one component
25 selected from the group consisting of: heptane, ligroin, mineral spirits, naphtha,
and toluene.

17. The composition of claim 3 wherein the fluoroiodocarbon comprises
CF₃CF₂CF₂CF₂CF₂CF₂I and the additive comprises at least one component
30 selected from the group consisting of: nonane, octane, petroleum spirits, and
Stoddard's solvent.

18. The composition of claim 3 wherein the fluoroiodocarbon comprises
CF₃CF₂CF₂CF₂CF₂CF₂CF₂I and the additive comprises at least one
35 component selected from the group consisting of: decane, hexyl acetate,
limonene, mineral spirits, naphtha, petroleum spirits, pinene, Stoddard's solvent,
turpentine, and undecane.

19. A composition of matter comprising a blend of at least two fluoroiodocarbons having the formula $C_aH_bBr_cCl_dFeIfN_gO_h$, wherein a is between and including 1 and 8; b is between and including 0 and 2; c, d, g, and h are each between and including 0 and 1; e is between and including 1 and 18; and f is between and including 1 and 2.

20. The composition of claim 19 wherein the fluoroiodocarbons comprise at least one compound selected from the group consisting of:
bromodifluoroiodomethane, chlorodifluoroiodomethane, 1,1,2,2,3,3,4,4,5,5-
10 decafluoro-1,5-diiodopentane, difluorodiiodomethane, difluoroiodomethane,
1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-1,6-diiodohexane, fluoroiodomethane,
1,1,1,2,3,3,3-heptafluoro-2-iodopropane, 1,1,2,2,3,3,3-heptafluoro-1-
iodopropane, 1,1,2,2,3,3-hexafluoro-1,3-diiodopropane, 1-iodoheptadeca-
fluoroctane, iodoheptafluorocyclobutane, 1-iodopentadecafluoroheptane,
15 iodopentafluoro-cyclopropane, 1-iodotridecafluorohexane, 1-iodoundeca-
fluoropentane, N-iodobis-(trifluoromethyl)amine, 1,1,2,2,3,3,4,4,4-nonafluoro-1-
iodobutane, 1,1,2,2,3,3,4,4-octafluoro-1,4-diiodobutane, pentafluoroiodoethane,
1,1,2,2-tetrafluoro-1,2-diidoethane, 1,1,2,2-tetrafluoro-1-idoethane, 1,1,2-
20 trifluoro-1-idoethane, trifluoroiodomethane, and trifluoromethyl-1,1,2,2-
tetrafluoro-2-idoethyl ether.

21. The composition of claim 19 further comprising an additive.

22. The composition of claim 21 in which the additive comprises at least
25 one component selected from the group consisting of: alcohols, esters, ethers,
fluoroethers, hydrocarbons, hydrofluorocarbons, ketones, and perfluorocarbons.

23. A method of making a composition of matter comprising the step of
blending a fluoroiodocarbon having the formula $C_aH_bBr_cCl_dFeIfN_gO_h$, wherein a
30 is between and including 1 and 8; b is between and including 0 and 2; c, d, g, and
h are each between and including 0 and 1; e is between and including 1 and 18;
and f is between and including 1 and 2 with an additive.

24. The method of claim 23 wherein the additive comprises at least one
35 chemical selected from the group consisting of: alcohols, esters, ethers,
fluoroethers, hydrocarbons, hydrofluorocarbons, ketones, and perfluorocarbons.

25. The method of claim 23 wherein the step of blending a fluoriodocarbon with an additive further comprises the step of blending at least one fluorocarbon selected from the group consisting of: bromodifluoriodomethane, chlorodifluoriodomethane, 1,1,2,2,3,3,4,4,5,5-decafluoro-1,5-diiodopentane, difluorodiiodomethane, difluoriodomethane, 1,1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-1,6-diiodohexane, fluoriodomethane, 1,1,1,2,3,3,3-heptafluoro-2-iodopropane, 1,1,2,2,3,3,3-heptafluoro-1-iodopropane, 1,1,2,2,3,3-hexafluoro-1,3-diiodopropane, 1-iodoheptadeca-fluorooctane, iodoheptafluorocyclobutane, 1-iodopentadeca-fluoroheptane, 10 iodopentafluorocyclopropane, 1-iodotridecafluorohexane, 1-iodo-undecafluoropentane, N-iodobis-(trifluoromethyl)amine, 1,1,2,2,3,3,4,4,4-nonafluoro-1-iodobutane, 1,1,2,2,3,3,4,4-octafluoro-1,4-diiodobutane, pentafluoriodoethane, 1,1,2,2-tetrafluoro-1,2-diidoethane, 1,1,2,2-tetrafluoro-1-iodoethane, 1,1,2-trifluoro-1-iodoethane, trifluoriodomethane, and 15 trifluoromethyl-1,1,2,2-tetrafluoro-2-iodoethyl ether.

26. The method of claim 25 wherein the additive comprises at least one member selected from the group consisting of: alcohols, esters, ethers, fluoroethers, hydrocarbons, hydrofluorocarbons, ketones, and perfluorocarbons.

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27. The method of claim 26 wherein the step of blending a fluoriodocarbon with an additive comprises blending CF_3I with trifluoromethane.

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28. The method of claim 26 wherein the step of blending a fluoriodocarbon with an additive comprises blending CF_3I with difluoromethane.

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29. The method of claim 26 wherein the step of blending a fluoriodocarbon with an additive comprises blending CF_3I with pentafluoroethane.

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30. The method of claim 26 wherein the step of blending a fluoriodocarbon with an additive comprises blending CF_3I with 1,1,1-trifluoroethane.

31. The method of claim 26 wherein the step of blending a fluoriodocarbon with an additive comprises blending CF_3I with propane.

32. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending CF_3I with 1,1-difluoroethane.

5 33. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending CF_3I with 1,1,1,2-tetrafluoroethane.

10 34. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending CF_3I with butane.

10 35. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending CF_3I with pentafluoroiodoethane.

15 36. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending CF_3CF_2I with at least one component selected from the group: butane and isobutane.

20 37. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3CF_2CF_2I$ with butane.

25 38. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3CF_2CF_2I$ with diethyl ether.

30 39. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3CF_2CF_2I$ with pentane.

35 40. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_3I$ with acetone.

41. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_3I$ with methyl acetate.

35 42. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_3I$ with methanol.

43. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_3I$ with tetrahydrofuran.

5 44. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_4I$ with at least one component selected from the group: ligroin, naphtha, and petroleum ether.

10 45. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_4I$ with ethanol.

46. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_4I$ with butanone.

15 47. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_4I$ with 2-propanol.

20 48. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_4I$ with ethyl acetate.

25 49. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_4I$ with heptane.

50. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_5I$ with at least one component selected from the group: heptane, ligroin, mineral spirits, toluene, petroleum ether.

30 51. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_6I$ with at least one component selected from the group: ligroin, mineral spirits, octane, nonane, petroleum ether.

35 52. The method of claim 26 wherein the step of blending a fluoroiodocarbon with an additive comprises blending $CF_3(CF_2)_7I$ with at least one component selected from the group consisting of: decane, hexyl acetate,

ligroin, limonene, mineral spirits, petroleum ether, pinene, Stoddard's solvent, turpentine, and undecane.

53. The method of claim 26 wherein the step of providing an additive comprises providing an alcohol selected from the group consisting of: 1-butanol, 2-butanol, ethanol, methanol, 2-methyl-1-propanol, 2-methyl-2-propanol, 1-pentanol, 2-pentanol, 1-propanol, and 2-propanol.

54. The method of claim 26 wherein the step of providing an additive comprises providing an ester selected from the group consisting of: ethyl acetate, ethyl butanoate, ethyl propanoate, n-butyl acetate, hexyl acetate, n-pentyl acetate, isobutyl acetate, isopropyl acetate, methyl acetate, methyl butanoate, methyl propanoate, n-propyl acetate, and sec-butyl acetate.

55. The method of claim 26 wherein the additive comprises providing an ether selected from the group consisting of: diethyl ether, diisopropyl ether, dimethyl ether, di-n-butyl, di-n-propyl ether, 1,4-dioxane, ethylene oxide, propylene oxide, and tetrahydrofuran.

56. The method of claim 26 wherein the additive comprises a fluoroether selected from the group consisting of: bis-difluoromethyl ether, hexafluorodimethyl ether, hexafluorooxetane, methyl trifluoromethyl ether, octafluorodimethoxymethane, octafluoro-1,3-dioxolane, pentafluorodimethyl ether, 1,1,2',2',2'-pentafluoro methyl ethyl ether, and 1-trifluoromethoxy-1,1,2,2-tetrafluoroethane.

57. The method of claim 26 wherein the additive comprises a hydrocarbon selected from the group consisting of: butane, cyclopropane, decane, 2,3-dimethylpentane, 2,4-dimethylpentane, 2,2-dimethylpropane, heptane, hexane, isobutane, ligroin, limonene, 2-methylbutane, 3-methylhexane, 3-methylpentane, mineral spirits, naphtha, nonane, octane, pentane, petroleum ether, petroleum spirits, pinene, propane, Stoddard's solvent, toluene, turpentine, and undecane.

58. The method of claim 26 wherein the additive comprises a hydrofluorocarbon selected from the group consisting of: difluoromethane, 1,1-difluoroethane, 1,1,1,2,3,3-heptafluoropropane, pentafluoroethane, 1,1,2,2,3-

pentafluoropropane, 1,1,1,2-tetrafluoroethane, 1,1,1-trifluoroethane, and trifluoromethane.

59. The method of claim 26 wherein the additive comprises a
 5. perfluorocarbon selected from the group consisting of: decafluorobutane, dodecafluoropentane, hexafluorocyclopropane, hexafluoroethane, octafluorocyclobutane, octafluoropropane, tetradecafluorohexane, and tetrafluoromethane.

10 60. A method of using a refrigerant comprising the steps of:
 a) placing a quantity of refrigerant into a cooling system, wherein the refrigerant is a fluoroiodocarbon having the general formula
 $C_aH_bBr_cCl_dFeI_fN_gO_h$, wherein a is between and including 1 and 8; b is between and including 0 and 2; c, d, g, and h are each between and including 0 and 1; e is
 15 between and including 1 and 18; and f is between and including 1 and 2; and
 b) operating the cooling system.

61. The method of claim 60 wherein the step of placing a quantity of refrigerant comprises placing at least one fluoroiodocarbon selected from the
 20 group: bromodifluoroiodomethane, chlorodifluoroiodomethane, 1,1,2,2,3,3,4,4,5,5-decafluoro-1,5-diiodopentane, difluorodiiodomethane, difluoroiodomethane, 1,1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-1,6-diiodohexane, fluoroiodomethane, 1,1,1,2,3,3,3-heptafluoro-2-iodopropane, 1,1,2,2,3,3,3-heptafluoro-1-iodopropane, 1,1,2,2,3,3-hexafluoro-1,3-diiodopropane, 1-
 25 iodoheptadecafluoroctane, iodoheptafluorocyclobutane, 1-iodopentadecafluoroheptane, iodopentafluoro-cyclopropane, 1-iodotridecafluorohexane, 1-iodoundecafluoropentane, N-iodobis-(trifluoromethyl)amine, 1,1,2,2,3,3,4,4,4-nonafluoro-1-iodobutane, 1,1,2,2,3,3,4,4-octafluoro-1,4-diiodobutane, pentafluorooiodoethane, 1,1,2,2-tetrafluoro-1,2-diidoethane, 1,1,2,2-tetrafluoro-1-iodoethane, 1,1,2-trifluoro-1-iodoethane, trifluorooiodomethane, and trifluoromethyl-1,1,2,2-tetrafluoro-2-iodoethyl ether.

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 35 62. The method of claim 60 further comprising the step of providing an additive.

63. The method of claim 62 wherein the step of providing an additive comprises providing an additive comprising a member selected from the group

consisting of: alcohols, ethers, fluoroethers, hydrocarbons, hydrofluorocarbons, and perfluorocarbons.

64. The method of claim 62 wherein the step of providing a
5 fluoriodocarbon comprises providing CF_3I and the step of providing an additive
comprises providing difluoromethane.

65. The method of claim 62 wherein the step of providing a
fluoriodocarbon comprises providing CF_3I and the step of providing an additive
10 comprises providing pentafluoroethane.

66. The method of claim 62 wherein the step of providing a
fluoriodocarbon comprises providing CF_3I and the step of providing an additive
comprises providing propane.

15 67. The method of claim 62 wherein the step of providing a
fluoriodocarbon comprises providing CF_3I and the step of providing an additive
comprises providing 1,1-difluoroethane.

20 68. The method of claim 62 wherein the step of providing a
fluoriodocarbon comprises providing CF_3I and the step of providing an additive
comprises providing butane.

25 69. The method of claim 62 wherein the step of providing a
fluoriodocarbon comprises providing CF_3I and the step of providing an additive
comprises providing 1,1,1-trifluoroethane.

70. The method of claim 62 wherein the step of providing a
fluoriodocarbon comprises providing CF_3I and the step of providing an additive
30 comprises providing 1,1,1,2-tetrafluoroethane.

71. The method of claim 62 wherein the step of providing a
fluoriodocarbon comprises providing CF_3CF_2I and the step of providing an
additive comprises providing isobutane.

35 72. The method of claim 62 wherein the step of providing a
fluoriodocarbon comprises providing CF_3CF_2I and the step of providing an
additive comprises providing butane.

73. The method of claim 62 wherein the step of providing a fluoroiodocarbon comprises providing $\text{CF}_3\text{CF}_2\text{CF}_2\text{CF}_2\text{I}$ and the step of providing an additive comprises providing acetone.

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74. The method of claim 62 wherein the step of providing an additive comprises providing an alcohol selected from the group consisting of: 1-butanol, 2-butanol, ethanol, methanol, 2-methyl-1-propanol, 2-methyl-2-propanol, 1-pentanol, 2-pentanol, 1-propanol, and 2-propanol.

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75. The method of claim 62 wherein the step of providing an additive comprises providing an ether selected from the group consisting of: diethyl ether, diisopropyl ether, dimethyl ether, di-*n*-butyl, di-*n*-propyl ether, 1,4-dioxane, ethylene oxide, propylene oxide, and tetrahydrofuran.

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76. The method of claim 62 wherein the step of providing an additive comprises providing a fluoroether selected from the group consisting of: bis-difluoromethyl ether, hexafluorodimethyl ether, hexafluorooxetane, methyl trifluoromethyl ether, octafluorodimethoxymethane, octafluoro-1,3-dioxolane, pentafluorodimethyl ether, 1,1,2',2',2'-pentafluoro methyl ethyl ether, and 1-trifluoromethoxy-1,1,2,2-tetrafluoroethane.

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77. The method of claim 62 wherein the step of providing an additive comprises providing a hydrocarbon selected from the group consisting of: butane, cyclopropane, 2,2-dimethylpropane, hexane, isobutane, 2-methylbutane, 3-methylpentane, pentane, and propane.

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78. The method of claim 62 wherein the step of providing an additive comprises providing a hydrofluorocarbon selected from the group consisting of: difluoromethane, 1,1-difluoroethane, 1,1,1,2,3,3-heptafluoropropane, pentafluoroethane, 1,1,2,2,3-pentafluoropropane, 1,1,1,2-tetrafluoroethane, 1,1,1-trifluoroethane, and trifluoromethane.

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79. The method of claim 62 wherein the step of providing an additive comprises providing a perfluorocarbon selected from the group consisting of: decafluorobutane, dodecafluoropentane, hexafluorocyclopropane, hexafluoroethane, octafluorocyclobutane, octafluoropropane, tetradecafluorohexane, and tetrafluoromethane.

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80. A method of making a composition of matter comprising the step of blending at least two fluoroiodocarbons having the formula $C_aH_bBr_cCl_dFeIf^N_gO_h$, wherein a is between and including 1 and 8; b is between 5 and including 0 and 2; c, d, g, and h are each between and including 0 and 1; e is between and including 1 and 18; and f is between and including 1 and 2.

81. The method of claim 80 wherein the step of blending at least two fluoroiodocarbons further comprises the step of blending at least one compound 10 selected from the group consisting of: bromodifluoroiodomethane, chlorodifluoroiodomethane, 1,1,2,2,3,3,4,4,5,5-decafluoro-1,5-diiodopentane, difluorodiiodomethane, difluoroiodomethane, 1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-1,6-diiodohexane, fluoroiodomethane, 1,1,1,2,3,3,3-heptafluoro-2-iodopropane, 1,1,2,2,3,3,3-heptafluoro-1-iodopropane, 1,1,2,2,3,3-hexafluoro-1,3-diiodopropane, 1-iodoheptadecafluoroctane, iodoheptafluorocyclobutane, 1-iodopentadecafluoroheptane, iodopentafluoro-cyclopropane, 1-iodotri-decafluorohexane, 1-iodoundecafluoropentane, N-iodobis-(trifluoromethyl)amine, 1,1,2,2,3,3,4,4,4-nonafluoro-1-iodobutane, 1,1,2,2,3,3,4,4-octafluoro-1,4-diiodobutane, pentafluoroiodoethane, 1,1,2,2-tetrafluoro-1,2-diidoethane, 20 1,1,2,2-tetrafluoro-1-idoethane, 1,1,2-trifluoro-1-idoethane, trifluoroiodomethane, and trifluoromethyl-1,1,2,2-tetrafluoro-2-idoethyl ether.

82. The method of claim 81 further comprising the step of providing an additive.

25 83. The method of claim 82 in which the additive comprises at least one component selected from the group consisting of: alcohols, esters, ethers, fluoroethers, hydrocarbons, hydrofluorocarbons, and perfluorocarbons.

30 84. A method of using a solvent comprising the steps of:
 a) providing a quantity of solvent to an applicator, where the solvent is a fluoroiodocarbon having the general formula $C_aH_bBr_cCl_dFeIf^N_gO_h$, wherein a is between and including 1 and 8; b is between and including 0 and 2; c, d, g, and h are each between and including 0 and 1; e is between and including 1 and 18; and f is between and including 1 and 2; and
 35 b) applying the solvent to an article.

85. The method of claim 84 wherein the step of providing a quantity of solvent comprises providing at least one fluoriodocarbon selected from the group: bromodifluoroiodomethane, chlorodifluoroiodomethane, 1,1,2,2,3,3,4,4,5,5-decafluoro-1,5-diodopentane, difluorodiiodomethane, difluoroiodomethane, 1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-1,6-diodohexane, fluoroiodomethane, 1,1,1,2,3,3,3-heptafluoro-2-iodopropane, 1,1,2,2,3,3,3-heptafluoro-1-iodopropane, 1,1,2,2,3,3-hexafluoro-1,3-diodopropane, iodoheptadecafluoroctane, iodoheptafluorocyclobutane, 1-iodopentadecafluoroheptane, iodopentafluoro-cyclopropane, 1-iodotridecafluorohexane, 1-iodoundecafluoropentane, N-iodobis-(trifluoromethyl)amine, 1,1,2,2,3,3,4,4,4-nonafluoro-1-iodobutane, 1,1,2,2,3,3,4,4-octafluoro-1,4-diodobutane, pentafluoroiodoethane, 1,1,2,2-tetrafluoro-1,2-diodoethane, 1,1,2,2-tetrafluoro-1-idoethane, 1,1,2-trifluoro-1-idoethane, trifluoroiodomethane, and trifluoromethyl-1,1,2,2-tetrafluoro-2-idoethyl ether.

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86. The method of claim 84 further comprising the step of providing an additive.

87. The method of claim 84 wherein the step of providing an additive comprises providing an additive comprising a member selected from the group consisting of: alcohols, esters, ethers, fluoroethers, hydrocarbons, hydrofluorocarbons, ketones, and perfluorocarbons.

88. The method of claim 87 wherein the step of providing an additive comprises providing an alcohol selected from the group consisting of: 1-butanol, 2-butanol, ethanol, methanol, 2-methyl-1-propanol, 2-methyl-2-propanol, 1-pentanol, 2-pentanol, 1-propanol, and 2-propanol.

89. The method of claim 87 wherein the step of providing an additive comprises providing an ester selected from the group consisting of: ethyl acetate, hexyl acetate, *n*-pentyl acetate, isopropyl acetate, and methyl acetate.

90. The method of claim 87 wherein the step of providing an additive comprises providing an ether selected from the group consisting of: diethyl ether, diisopropyl ether, dimethyl ether, di-*n*-butyl, di-*n*-propyl ether, 1,4-dioxane, ethylene oxide, propylene oxide, and tetrahydrofuran.

91. The method of claim 87 wherein the step of providing an additive comprises providing a fluoroether selected from the group consisting of: bis-difluoromethyl ether, hexafluorodimethyl ether, hexafluorooxetane, methyl trifluoromethyl ether, octafluorodimethoxymethane, octafluoro-1,3-dioxolane, 5 pentafluorodimethyl ether, 1,1,2',2',2'-pentafluoro methyl ethyl ether, and 1-trifluoromethoxy-1,1,2,2-tetrafluoroethane.

92. The method of claim 87 wherein the step of providing an additive comprises providing a hydrocarbon selected from the group consisting of: 10 decane, 2,3-dimethylpentane, 2,4-dimethylpentane, 2,2-dimethylpropane, heptane, hexane, isobutane, ligroin, 2-methylbutane, 3-methylhexane, 3-methylpentane, mineral spirits, naphtha, nonane, octane, pentane, petroleum ether, petroleum spirits, pinene, propane, Stoddard's solvent, turpentine, undecane.

15 93. The method of claim 87 wherein the step of providing an additive comprises providing a hydrofluorocarbon selected from the group consisting of: difluoromethane, 1,1-difluoroethane, 1,1,1,2,3,3,3-heptafluoropropane, pentafluoroethane, 1,1,2,2,3-pentafluoropropane, 1,1,1,2-tetrafluoroethane, 1,1,1-trifluoroethane, and trifluoromethane.

20 94. The method of claim 87 wherein the step of providing an additive comprises providing a ketone selected from the group consisting of: acetone, 2-butanone, and 3-methyl-2-butanone.

25 95. The method of claim 87 wherein the step of providing an additive comprises providing a perfluorocarbon selected from the group consisting of: decafluorobutane, dodecafluoropentane, hexafluorocyclopropane, hexafluoroethane, octafluorocyclobutane, octafluoropropane, tetradecafluorohexane, and tetrafluoromethane.

30 96. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $\text{CF}_3\text{CF}_2\text{CF}_2\text{I}$ and the step of providing an additive comprises providing diethyl ether.

35 97. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $\text{CF}_3\text{CF}_2\text{CF}_2\text{I}$ and the step of providing an additive comprises providing pentane.

98. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $CF_3(CF_2)_3I$ and the step of providing an additive comprises providing acetone.

5 99. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $CF_3(CF_2)_3I$ and the step of providing an additive comprises providing methyl acetate.

10 100. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $CF_3(CF_2)_3I$ and the step of providing an additive comprises providing methanol.

15 101. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $CF_3(CF_2)_3I$ and the step of providing an additive comprises providing tetrahydrofuran.

20 102. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $CF_3(CF_2)_3I$ and the step of providing an additive comprises providing hexanes.

25 103. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $CF_3(CF_2)_4I$ and the step of providing an additive comprises providing ligroin.

30 104. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $CF_3(CF_2)_4I$ and the step of providing an additive comprises providing ethanol.

35 105. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $CF_3(CF_2)_4I$ and the step of providing an additive comprises providing butanone.

106. The method of claim 87 wherein the step of providing a fluoriodocarbon comprises providing $CF_3(CF_2)_4I$ and the step of providing an additive comprises providing 2-propanol.

107. The method of claim 87 wherein the step of providing a fluoroiodocarbon comprises providing $CF_3(CF_2)_4I$ and the step of providing an additive comprises providing ethyl acetate.

5 108. The method of claim 87 wherein the step of providing a fluoroiodocarbon comprises providing $CF_3(CF_2)_4I$ and the step of providing an additive comprises providing isopropyl acetate.

10 109. The method of claim 87 wherein the step of providing a fluoroiodocarbon comprises providing $CF_3(CF_2)_4I$ and the step of providing an additive comprises providing heptane.

15 110. The method of claim 87 wherein the step of providing a fluoroiodocarbon comprises providing $CF_3(CF_2)_5I$ and the step of providing an additive comprises providing heptane.

20 111. The method of claim 87 wherein the step of providing a fluoroiodocarbon comprises providing $CF_3(CF_2)_5I$ and the step of providing an additive comprises providing toluene.

112. The method of claim 87 wherein the step of providing a fluoroiodocarbon comprises providing $CF_3(CF_2)_7I$ and the step of providing an additive comprises providing limonene.

25 113. The method of claim 87 wherein the step of providing a fluoroiodocarbon comprises providing $CF_3(CF_2)_7I$ and the step of providing an additive comprises providing hexyl acetate.

30 114. A method of using a foam blowing agent comprising the steps of:
a) injecting a foam blowing agent into a monomer, where the foam blowing agent is a fluoroiodocarbon having the general formula $C_aH_bBr_cCl_dFeIfN_gO_h$, wherein a is between and including 1 and 8; b is between and including 0 and 2; c, d, g, and h are each between and including 0 and 1; e is between and including 1 and 18; and f is between and including 1 and 2;
35 b) allowing the monomer to polymerize;
c) allowing the agent to substantially vaporize; and
d) allowing the cell walls to harden.

115. The method of claim 114 wherein the step of placing a quantity of foam blowing agent comprises placing at least one fluoroiodocarbon selected from the group: bromodifluoroiodomethane, chlorodifluoroiodomethane, difluorodiiodomethane, difluoroiodomethane, fluoroiodomethane, 1,1,1,2,3,3,3-5 heptafluoro-2-iodopropane, 1,1,2,2,3,3,3-heptafluoro-1-iodopropane, iodoheptafluorocyclobutane, iodopentafluorocyclopropane, N-iodobis-(trifluoromethyl)amine, 1,1,2,2,3,3,4,4,4-nonafluoro-1-iodobutane, pentafluoroiodoethane, 1,1,2,2-tetrafluoro-1,2-diidoethane, 1,1,2,2-tetrafluoro-1-idoethane, 1,1,2-trifluoro-1-idoethane, trifluoroiodomethane, and 10 trifluoromethyl-1,1,2,2-tetrafluoro-2-iodoethyl ether.

116. The method of claim 114 further comprising the step of providing an additive.

15 117. The method of claim 116 wherein the step of providing an additive comprises providing an additive comprising a member selected from the group consisting of: ethers, fluoroethers, hydrocarbons, hydrofluorocarbons, ketones, and perfluorocarbons.

20 118. The method of claim 117 wherein the step of providing an additive comprises providing pentane and the step of providing a fluoroiodocarbon comprises providing a fluoroiodocarbon selected from the group consisting of: CF_3I , $\text{CF}_3\text{CF}_2\text{I}$, and $\text{CF}_3\text{CF}_2\text{CF}_2\text{I}$.

25 119. The method of claim 117 wherein the step of providing an additive comprises providing an ether selected from the group consisting of: diethyl ether, diisopropyl ether, dimethyl ether, di-n-butyl, di-n-propyl ether, 1,4-dioxane, ethylene oxide, propylene oxide, and tetrahydrofuran.

30 120. The method of claim 117 wherein the step of providing an additive comprises providing a fluoroether selected from the group consisting of: bis-difluoromethyl ether, hexafluorodimethyl ether, hexafluorooxetane, methyl trifluoromethyl ether, octafluorodimethoxymethane, octafluoro-1,3-dioxolane, pentafluorodimethyl ether, 1,1,2',2',2'-pentafluoro methyl ethyl ether, and 1-35 trifluoromethoxy-1,1,2,2-tetrafluoroethane.

121. The method of claim 117 wherein the step of providing an additive comprises providing a hydrocarbon selected from the group consisting of: butane,

cyclopropane, 2,2-dimethylpropane, hexane, isobutane, ligroin, 2-methylbutane, 3-methylpentane, pentane, petroleum ether, and propane.

122. The method of claim 117 wherein the step of providing an additive
5 comprises providing a hydrofluorocarbon selected from the group consisting of: difluoromethane, 1,1-difluoroethane, 1,1,1,2,3,3,3-heptafluoropropane, pentafluoroethane, 1,1,2,2,3-pentafluoropropane, 1,1,1,2-tetrafluoroethane, 1,1,1-trifluoroethane, and trifluoromethane.

10 123. The method of claim 117 wherein the step of providing an additive
comprises providing a perfluorocarbon selected from the group consisting of: decafluorobutane, dodecafluoropentane, hexafluorocyclopropane, hexafluoroethane, octafluorocyclobutane, octafluoropropane, and tetrafluoromethane.

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124. A method of using a propellant comprising the steps of:
a. placing the material to be discharged into a container;
b. charging the container with the propellant, where the propellant is
selected from the group of fluoroiodocarbons of the general formula
20 $C_aH_bBr_cCl_dFeIfN_gO_h$, wherein a is between and including 1 and 8; b is between and including 0 and 2; c, d, g, and h are each between and including 0 and 1; e is between and including 1 and 18; and f is between and including 1 and 2; and
c. discharging the contents.

25

125. The method of claim 124 wherein the step of charging the container with propellant comprises charging with at least one fluoroiodocarbon selected from the group: bromodifluoroiodomethane, chlorodifluoroiodomethane, difluorodiiodomethane, difluoroiodomethane, fluoroiodomethane, 1,1,1,2,3,3,3-heptafluoro-2-iodopropane, 1,1,2,2,3,3,3-heptafluoro-1-iodopropane, 30 iodoheptafluorocyclobutane, iodopentafluoro-cyclopropane, 1-iodotrideca-fluorohexane, 1-iodoundecafluoropentane, N-iodobis-(trifluoromethyl)amine, pentafluoriodoethane, 1,1,2,2-tetrafluoro-1,2-diidoethane, 1,1,2,2-tetrafluoro-1-idoethane, 1,1,2-trifluoro-1-idoethane, trifluoroiodomethane, and trifluoromethyl-1,1,2,2-tetrafluoro-2-idoethyl ether.

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126. The method of claim 124 further comprising the step of providing an additive.

127. The method of claim 126 wherein the step of providing an additive comprises providing an additive comprising a member selected from the group consisting of: ethers, fluoroethers, hydrocarbons, hydrofluorocarbons, perfluorocarbons, and carbon dioxide.

5.

128. The method of claim 126 wherein the step of providing a fluoroiodocarbon comprises providing CF_3I and the step of providing an additive comprises providing difluoromethane.

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129. The method of claim 126 wherein the step of providing a fluoroiodocarbon comprises providing CF_3I and the step of providing an additive comprises providing 1,1,1-trifluoroethane.

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130. The method of claim 126 wherein the step of providing a fluoroiodocarbon comprises providing CF_3I and the step of providing an additive comprises providing propane.

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131. The method of claim 126 wherein the step of providing a fluoroiodocarbon comprises providing CF_3I and the step of providing an additive comprises providing 1,1-difluoroethane.

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132. The method of claim 126 wherein the step of providing a fluoroiodocarbon comprises providing CF_3I and the step of providing an additive comprises providing butane.

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133. The method of claim 126 wherein the step of providing a fluoroiodocarbon comprises providing CF_3CF_2I and the step of providing an additive comprises providing butane.

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134. The method of claim 126 wherein the step of providing a fluoroiodocarbon comprises providing CF_3CF_2I and the step of providing an additive comprises providing isobutane.

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135. The method of claim 126 wherein the step of providing an additive comprises providing an ether selected from the group consisting of: diethyl ether, diisopropyl ether, dimethyl ether, di-*n*-butyl, di-*n*-propyl ether, 1,4-dioxane, ethylene oxide, propylene oxide, and tetrahydrofuran.

136. The method of claim 126 wherein the step of providing an additive comprises providing a fluoroether selected from the group consisting of: bis-difluoromethyl ether, hexafluorodimethyl ether, hexafluoroacetone, methyl trifluoromethyl ether, octafluorodimethoxymethane, octafluoro-1,3-dioxolane, 5 pentafluorodimethyl ether, 1,1,2',2',2'-pentafluoro methyl ethyl ether, and 1-trifluoromethoxy-1,1,2,2-tetrafluoroethane.

137. The method of claim 126 wherein the step of providing an additive comprises providing a hydrocarbon selected from the group consisting of: butane, 10 cyclopropane, isobutane, pentane, and propane.

138. The method of claim 126 wherein the step of providing an additive comprises providing a hydrofluorocarbon selected from the group consisting of: difluoromethane, 1,1-difluoroethane, 1,1,1,2,3,3-heptafluoropropane, 15 pentafluoroethane, 1,1,2,2,3-pentafluoropropane, 1,1,1,2-tetrafluoroethane, 1,1,1-trifluoroethane, and trifluoromethane.

139. The method of claim 126 wherein the step of providing an additive comprises providing a perfluorocarbon selected from the group consisting of: 20 decafluorobutane, hexafluorocyclopropane, hexafluoroethane, octafluorocyclobutane, octafluoropropane, and tetrafluoromethane.

140. The method of claim 126 wherein the step of providing an additive comprises providing carbon dioxide.

25 141. A method of using a fire extinguishing agent comprising the steps of:
(a) placing a blend containing a fluoroiodocarbon in a discharge apparatus; and
(b) discharging the agent.

30 142. The method of claim 141 wherein the step of placing a blend containing a fluoroiodocarbon in a discharge apparatus comprises providing a blend containing a fluoroiodocarbon selected from the group consisting of: bromodifluoroiodomethane, chlorodifluoroiodomethane, 1,1,2,2,3,3,4,4,5,5-decafluoro-1,5-diiodopentane, difluorodiiodomethane, difluoroiodomethane, 35 1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-1,6-diiodohexane, fluoroiodomethane, 1,1,1,2,3,3,3-heptafluoro-2-iodopropane, 1,1,2,2,3,3,3-heptafluoro-1-iodopropane, 1,1,2,2,3,3-hexafluoro-1,3-diiodopropane, 1-iodoheptadeca-fluoroctane, iodoheptafluorocyclobutane, 1-iodopentadeca-fluoroheptane,

iodopentafluoro-cyclopropane, 1-iodotridecafluorohexane, 1-iodo-
undecafluoropentane, N-iodobis-(trifluoromethyl)amine, 1,1,2,2,3,3,4,4,4-
nonafluoro-1-iodobutane, 1,1,2,2,3,3,4,4-octafluoro-1,4-diiodobutane,
5· pentafluoroiodoethane, 1,1,2,2-tetrafluoro-1,2-diidoethane, 1,1,2,2-tetrafluoro-
1-iodoethane, 1,1,2-trifluoro-1-iodoethane, trifluoriodomethane, and
trifluoromethyl-1,1,2,2-tetrafluoro-2-iodoethyl ether.

143. The method of claim 141 further comprising the step of providing an additive.

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144. The method of claim 143 wherein the step of providing an additive comprises providing an additive selected from the group consisting of:
hydrofluorocarbons, perfluorocarbons, and fluoroethers.

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145. The method of claim 143 wherein the step of providing a fluoriodocarbon comprises providing CF_3I and the step of providing an additive comprises providing trifluoromethane.

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146. The method of claim 143 wherein the step of providing a fluoriodocarbon comprises providing CF_3I and the step of providing an additive comprises providing difluoromethane.

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147. The method of claim 143 wherein the step of providing a fluoriodocarbon comprises providing CF_3I and the step of providing an additive comprises providing pentafluoroethane.

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148. The method of claim 143 wherein the step of providing a fluoriodocarbon comprises providing CF_3I and the step of providing an additive comprises providing 1,1,1,2-tetrafluoroethane.

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149. The method of claim 143 wherein the step of providing a fluoriodocarbon comprises providing CF_3I and the step of providing an additive comprises providing 1,1,1-trifluoroethane.

150. The method of claim 143 wherein the step of providing a fluoriodocarbon comprises providing CF_3I and the step of providing an additive comprises providing 1,1-difluoroethane.

151. The method of claim 143 wherein the step of providing a fluoroiodocarbon comprises providing CF_3I and the step of providing an additive comprises providing perfluorobutane.

152. The method of claim 143 wherein the step of providing a fluoroiodocarbon comprises providing $\text{CF}_3\text{CF}_2\text{CF}_2\text{I}$ and the step of providing an additive comprises providing perfluorohexane.

153. The method of claim 143 wherein the step of providing an additive comprises providing a hydrofluorocarbon selected from the group of consisting of: 1,1-difluoroethane, difluoromethane, 1,1,1,2,3,3,3-heptafluoropropane, pentafluoroethane, 1,1,2,2,3-pentafluoropropane, 1,1,1,2-tetrafluoroethane, 1,1,2,2-tetrafluoroethane, 1,1,1-trifluoroethane, 1,1,2-trifluoroethane, and trifluoromethane.

154. The method of claim 143 wherein the step of providing an additive comprises providing a perfluorocarbon selected from the group of consisting of: decafluorobutane, dodecafluoropentane, hexafluorocyclopropane, hexafluoroethane, octafluorocyclobutane, octafluoropropane, tetradecafluorohexane, and tetrafluoromethane.

155. The method of claim 143 wherein the step of providing an additive comprises providing a fluoroether selected from the group of consisting of: bis-difluoromethyl ether, methyl trifluoromethyl ether, octafluoro-1,3-dioxolane, 1,1,2',2',2'-pentafluoro methyl ethyl ether, perfluorodimethoxymethane, perfluorodimethyl ether, perfluorooxetane, difluoromethyl trifluoromethyl ether, trifluoromethyl pentafluoroethyl ether, and trifluoromethyl 1,1,2,2-tetrafluoroethyl ether.

156. A method of using a fire extinguishing agent comprising the steps of:
(a) placing the agent in a discharge apparatus; and
(b) discharging the agent, wherein the agent is selected from the group of fluoroiodocarbons consisting of: bromodifluoroiodomethane, chlorodifluoroiodomethane, 1,1,2,2,3,3,4,4,5,5-decafluoro-1,5-diiodopentane, 1,2,2,3,3,4,4,5,5,6,6-dodecafluoro-1,6-diiodohexane, 1,1,2,2,3,3-hexafluoro-1,3-diiodopropane, 1-iodoheptadecafluoroctane, iodoheptafluorocyclobutane, 1-iodopentadecafluoroheptane, iodopentafluorocyclopropane, 1-iodoundeca-fluoropentane, N-iodobis-(trifluoromethyl)amine, 1,1,2,2,3,3,4,4,4-nonafluoro-1-

iodobutane, 1,1,2,2,3,3,4,4-octfluoro-1,4-diiodobutane, 1,1,2,2-tetrafluoro-1,2-diiodoethane, and trifluoromethyl-1,2,2-tetrafluoro-2-iodoethyl ether.

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